

## NOAA In Your State

# Colorado

***NOAA is an agency that enriches life through science. Our reach goes from the surface of the sun to the depths of the ocean floor as we work to keep citizens informed of the changing environment around them. From daily weather forecasts, severe storm warnings, and climate monitoring to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and services support economic vitality and affect more than one-third of America's gross domestic product. NOAA's dedicated scientists use cutting-edge research and high-tech instrumentation to provide citizens, planners, emergency managers and other decision makers with reliable information they need when they need it.***

***The following is a summary of NOAA facilities, staff, programs, or activities based in, or focused on, your state or territory: Starting with highlights, then by [congressional districts and cities or towns](#), and then [statewide programs](#).***

### **Highlights of NOAA in Colorado**

<a href="#">Space Weather Prediction Center</a>	Boulder	CO-2
<a href="#">National Centers for Environmental Information</a>	Boulder	CO-2
<a href="#">Earth System Research Laboratory</a>	Boulder	CO-2
<a href="#">Center Weather Service Unit</a>	Denver	CO-2
<a href="#">Cooperative Institute for Research in the Atmosphere</a>	Fort Collins	CO-2
<a href="#">Regional and Mesoscale Meteorology Branch</a>	Fort Collins	CO-2
<a href="#">Cooperative Institute for Research in the Atmosphere (CIRA)</a>	Fort Collins	CO-2

The state of Colorado also has two Cooperative Institutes, three Weather Forecasting Offices, one Lab and Field Office, one NCEI regional office, one Regional and Mesoscale Meteorology branch, one Cooperative Institute, and five Science on a Sphere® exhibitions.

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### **Weather Forecast Offices**

Boulder CO-2

Grand Junction CO-3

Pueblo CO-3

**National Weather Service (NWS) Weather Forecast Offices (WFO)** are staffed 24/7/365 and provide weather, water, and climate forecasts and warnings to residents of Colorado. There are 122 [WFOs nationwide](#) of which three are in Colorado. Highly trained forecasters issue warnings and forecasts for weather events, including severe thunderstorms, tornadoes, hurricanes, winter storms, floods, and heat waves to the general public, media, emergency management and law enforcement officials, the aviation and marine communities, agricultural interests, businesses, and others. Information is disseminated in many ways, including wireless emergency alerts, social media, [weather.gov](#), and NOAA Weather Radio All Hazards. Each WFO has a Warning Coordination Meteorologist who actively conducts outreach and educational programs that strengthen working relationships with local partners in emergency management, government, the media and academic communities. Forecasters provide Impact-based Decision Support Services (IDSS), both remotely and on-site during critical emergencies such as wildfires, floods, chemical spills, and major recovery efforts. To gather data for forecasting and other purposes, NWS WFO staff monitor, maintain and use Automated Surface Observing Stations and Doppler Weather Radar. In addition to the WFOs, NWS operates specialized national prediction [centers](#) and regional headquarters throughout the U.S. for a total of 168 operational units. Over 85% of NWS' workforce is in the field. For current Colorado weather, visit [www.weather.gov](#) and, on the national map, click on the relevant county or district.

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### **Science On a Sphere®**

Denver CO-1

Boulder CO-2

Boulder CO-2

Boulder CO-2

Parker CO-4

Colorado Springs CO-5

**Science On a Sphere (SOS)** is a room-sized global display system that uses computers and video projectors to display planetary data onto a six-foot diameter sphere, analogous to a giant animated globe. Researchers at NOAA developed Science On a Sphere® as an educational tool to help illustrate Earth System science to people of all ages. Animated images of atmospheric storms, climate change, and ocean temperature can be shown on the sphere, which is used to explain in a way that is simultaneously intuitive and captivating what are sometimes complex environmental processes. They are located at the Museum of Nature and Science in Denver, NOAA's Earth System Research Laboratory in Boulder, David Skaggs Research Center in Boulder, The Wildlife Experience in Parker, and The Space Foundation in Colorado Springs.

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## CO-1

### Denver

Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere](#)- See [Page 2](#) for details.

### NOAA Office of Education - [Environmental Literacy Program](#)

NOAA's Environmental Literacy Program (ELP), administered by the Office of Education, provides grants and in-kind support to advance NOAA's mission through formal (K-12) and informal education. In Colorado, ELP supports the Denver Museum of Nature and Science (Denver), which has a permanent exhibit featuring NOAA's Science On a Sphere (SOS) and is a member of NOAA's SOS Users Collaborative Network (SOS Network). The SOS Network connects over 150 science education institutions worldwide to the latest NOAA data as part of a focused effort to increase environmental literacy at all ages.

## CO-2

### Boulder

### Acquisition and Grants Office (AGO) - [Boulder Office](#)

The Acquisition and Grants Office provides financial assistance and acquisition services for NOAA by overseeing and implementing all processes related to contracts and grants.

### National Ocean Service (NOS) – [National Geodetic Survey Boulder Office](#)

The David Skaggs Research Center in Boulder, CO houses Federal and contract employees in support of the National Geodetic Survey's Gravity and Global Navigation Satellite System (GNSS) programs. These personnel are involved in field work and validation measurements at Table Mountain Geophysical Observatory (TMGO) and around the country, and in support of the modernization of the National Spatial Reference System (NSRS).

### National Environmental Satellite, Data, and Information Service (NESDIS) - [Comprehensive Large Array-data Stewardship System \(CLASS\)](#)

The Comprehensive Large Array Storage System (CLASS) is NOAA's premiere online facility for the distribution of NOAA and US Department of Defense (DoD) Polar-orbiting Operational Environmental Satellite (POES) data, NOAA's Geostationary Operational Environmental Satellite (GOES) data, and derived data. This data is also backed up at another site located in Asheville, NC.

### National Environmental Satellite, Data, and Information Service (NESDIS) - [National Centers for Environmental Information](#)

NOAA's National Centers for Environmental Information (NCEI) are responsible for hosting and providing access to one of the most significant archives on earth, with comprehensive oceanic, atmospheric, and geophysical data. From the depths of the ocean to the surface of the sun and from million-year-old tree rings to near real-time satellite images, NCEI is the Nation's leading authority for environmental information. By preserving, stewarding, and maximizing the utility of the Federal government's billion-dollar investment in high-quality environmental data, NCEI provides environmental information, products, and services to private industry and businesses, local to international governments, academia, and general public to support informed decision making. NCEI headquarters are located in Asheville, North Carolina with other major locations in Boulder, Colorado; Silver Spring, Maryland; and Stennis Space Center, Mississippi.

### NOAA Office of Education - [Environmental Literacy Program](#)

NOAA's Environmental Literacy Program (ELP), administered by the Office of Education, provides grants and in-kind support to advance NOAA's mission through formal (K-12) and informal education. In Colorado, ELP funded the University Corporation for Atmospheric Research's Center for Science Education (Boulder) and the University of Colorado

Boulder's Cooperative Institute for Research in Environmental Sciences (Boulder) to build the environmental literacy of children, youth, and adults so they are knowledgeable of the ways in which their community can become more resilient to extreme weather, climate change, and other environmental hazards, and become involved in achieving that resilience. The University Corporation for Atmospheric Research's (UCAR) Center for Science Education works directly with students and community members to collect local stories of sea-level rise and erosion, coastal flooding, and hurricane damage and compare these stories with resources from NOAA's Digital Coast and the National Center for Atmospheric Research's Cyclone Damage Potential Index. UCAR's Center for Science Education is also creating a replicable, education model for schools in coastal communities that increases students' interest and skills in STEM, community engagement, and resilience planning. The University of Colorado's Cooperative Institute for Research in Environmental Sciences is developing four instructional units and use immersive scenario-based role play games focused on drought, flood, wildfire, and extreme heat. Participating middle and high school students in rural Colorado are exploring a locally relevant natural hazard and learn about existing mitigation and response plans. Students are identifying and developing resilience strategies for their communities and present their ideas at a Resilience Expo, which will serve as a dialogue between them and community stakeholders. ELP supports the University of Colorado Boulder's Fiske Planetarium (Boulder), which has a permanent exhibit featuring NOAA's Science On a Sphere (SOS) and is a member of NOAA's SOS Users Collaborative Network (SOS Network). The SOS Network connects over 150 science education institutions worldwide to the latest NOAA data as part of a focused effort to increase environmental literacy at all ages.

**Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)**

The US Climate Reference Network (USCRN) is an operationally viable research network of more than 138 climate stations that are deployed nationwide. Data from the USCRN are used in various climate monitoring activities and for placing current climate anomalies into an historical perspective. The USCRN provides the United States with a reference network that contributes to an International network under the auspices of the Global Climate Observing System (GCOS). ARL/ATDD manage the USCRN in partnership with NOAA's NESDIS/NCEI.

**National Weather Service (NWS) - [Space Weather Prediction Center](#)**

Space weather refers to variations in the space environment between the sun and Earth that have the potential to adversely affect critical functions, assets, and operations in space and on Earth that form the backbone of this country's economic vitality and national security. The NWS Space Weather Prediction Center (SWPC) is the Nation's official source for civilian space weather forecasts, warnings, alerts, and real-time space weather monitoring. SWPC operates 24/7 and coordinates its activities daily with its DOD counterpart, the 557th Weather Wing, located at Offutt AFB, in Bellevue, Nebraska. Through continuous and effective delivery of operational event-driven and regularly scheduled space weather products and services, SWPC protects the electric power grid, satellites and satellite communications, aviation operations, astronauts living and working in space, and space-based position, navigation, and timing systems (including GPS). SWPC supports actions to improve space weather forecasts including: sustaining and enhancing critical observations; identifying research needs and promoting opportunities for research-to-operations and operations-to-research collaborations both within and outside of the Federal Government; advancing space weather models; engaging with all sectors of the space weather community, including academia, the commercial sector, and international partners; and understanding the needs of space weather end users. SWPC is a key contributor to national and international efforts to develop and implement policy to build resilience to space weather storms.

**National Weather Service (NWS) - [Weather Forecast Office](#)- See [Page 2](#) for details.**

**Office of Oceanic and Atmospheric Research (OAR) - [National Integrated Drought Information System](#)**

The National Integrated Drought Information System (NIDIS) provides dynamic and easily accessible drought information for the Nation. Among the decision makers who are benefitting from this source of authoritative, reliable information are

farmers making decisions about crops, forestry professionals planning ahead for the next fire season, and urban water managers preparing for high-demand seasons. NIDIS provides data that help decision makers assess the risk of having too little water and prepare for and mitigate the effects of drought. NIDIS is continually developing more robust services and regional decision support resources.

**Office of Oceanic and Atmospheric Research (OAR) - [Western Water Assessment](#)**

The Western Water Assessment (WWA) is a cooperative agreement between NOAA's Climate Program Office (CPO) and the University of Colorado Boulder. It is one of several Regional Integrated Sciences and Assessments (RISA) teams contributing to the development of knowledge, expertise, and abilities of decision-makers to plan and prepare for climate variability and change. WWA conducts innovative research and engagement aimed at effectively and efficiently incorporating knowledge into decision making, in order to advance the ability of regional and national entities to manage climate impacts. In addition to conducting user-driven research projects to explore emerging climate vulnerabilities, WWA produces synthesis and assessment products to make existing knowledge more accessible. By providing useful products for stakeholders in the region, WWA also serves to prototype, for NOAA, the delivery of regional climate services. Stakeholders in the Intermountain West (Colorado, Utah, and Wyoming) have long faced challenges from climate variability and extreme events. WWA works with water resource managers, ecosystem managers, natural hazard planners, and other decision makers to understand, anticipate, and prepare for these challenges. Core partners of WWA include the University of Colorado Boulder and the Cooperative Institute for Research in Environmental Sciences (CIRES).

**Office of Oceanic and Atmospheric Research (OAR) - [Chemical Processes and Instrument Development Program](#)**

The Chemical Processes and Instrument Development program at the NOAA Earth Systems Research Laboratory's Chemical Sciences Division conducts controlled laboratory experiments to investigate fundamental chemical and physical properties of trace species emitted into or formed in the atmosphere and their impact on air quality, climate, and the stratosphere. A key activity, in collaboration with industry partners, is evaluation of stratospheric ozone depletion potential and global warming potentials of new compounds proposed as replacements for refrigerants and solvents.

**Office of Oceanic and Atmospheric Research (OAR) - [Cooperative Institute for Research in Environmental Sciences](#)**

The Cooperative Institute for Research in Environmental Sciences (CIRES) was established at the University of Colorado. CIRES serves as a key mechanism to promote collaborative research between university scientists and those in NOAA. The mission of CIRES is to “to conduct innovative research that advances our understanding of the global, regional, and local environments and the human relationship with those environments, for the benefit of society”. NOAA partners include the Earth System Research Laboratory within OAR, the National Centers for Environmental Information, and the Space Weather Prediction Center. CIRES conducts research across nine themes: (1) air quality in a changing climate; (2) climate forcing, feedbacks, and analysis; (3) Earth systems dynamics, variability, and change; (4) management and exploitation of geophysical data; (5) regional sciences and applications; (6) scientific outreach and education; (7) space weather understanding and prediction; (8) stratospheric processes and trends; and (9) systems and prediction models development.

**Office of Oceanic and Atmospheric Research (OAR) - [Earth System Research Laboratory](#)**

The Earth System Research Laboratory (ESRL) is based in the David Skaggs Research Center. It employs approximately 400 scientists, technicians, and support personnel, and maintains a number of facilities and programs locally and globally in order to execute NOAA Research missions. ESRL is organized as four divisions - Global Monitoring, Physical Sciences, Chemical Sciences, and Global Systems. The work of these Divisions includes monitoring atmospheric constituents, understanding climate processes and trends, providing climate information related to water

management decisions, improving weather prediction, understanding the recovery of the stratospheric ozone layer, and developing air quality forecast models. ESRL scientists serve in leadership positions for local, national and international climate and air quality science assessments. These research products provide long-term state-of-the-science references for local, regional and global policy makers. The vital work of scientists contributing to the IPCC was recognized with the awarding of the Nobel Peace Prize.

**Office of Oceanic and Atmospheric Research (OAR) - [Global Systems Laboratory](#)**

Located in Boulder, Colorado, the NOAA Global Systems Laboratory (GSL) of the Earth System Research Laboratories (ESRL) conducts world-class applied research and directed development resulting in technology transfer of environmental data, models, products, and services that enhance environmental understanding with the outcome of supporting commerce, supporting NWS in protecting life and property, and promoting a scientifically literate public.

**Office of Oceanic and Atmospheric Research (OAR) - [Forecasting Applications Testing Facility](#)**

The Hazard Services project hosts National Weather Service forecasters at the GSL Forecasting Applications Testing Facility to test and receive feedback on a software application that will consolidate multiple hazard applications used by NWS forecasters into one application and modernize how National Weather Service (NWS) and National Centers for Environmental Prediction (NCEP) create forecasts, watches, and warnings for the public. The system provides a pathway to operations for promising science and technology to be more rapidly incorporated into the warning decision-making process. It is also the vehicle for bringing clear, direct language improvements into the watch/warning/advisory process to ensure more effective information is disseminated to the public. There are over 100 types of hazard watches, warnings, and advisories that can be issued by NWS forecasters.

**Office of Oceanic and Atmospheric Research (OAR) - [Supercomputing Facility](#)**

The GSL supercomputing facility is housed at the NOAA campus in Boulder, Colorado. The room's award-winning design can handle the rigorous environmental and electrical demands of the JET Supercomputing systems. State-of-the-art ambient air cooling and a clean-agent fire protection system, as well as many sophisticated facility monitoring and control safeguards, are features that add up to a highly reliable and resilient data center. This space enhances NOAA's ability to facilitate the efficient and timely delivery of products and services.

**Office of Oceanic and Atmospheric Research (OAR) - [JET Supercomputer](#)**

The JET Supercomputer primarily supports the High-Performance Computing (HPC) needs of the Hurricane Forecast Improvement Program (HFIP), GSL numerical weather prediction development, and other weather research. JET has been used to run real-time jobs, via reservation schemes, in support of HFIP during hurricane season and various other high-priority GSL Research to Operations (R2O) projects including the extensive testing which was necessary to ready the High-Resolution Rapid Refresh (HRRR) weather model for NOAA National Weather Service (NWS) operations. The JET system totals 55,984 cores of 64-bit Intel CPU's, with a total capability of 1,795 trillion floating point operations per second – TFLOPS with a total scratch disk capacity of 6.6 Petabytes.

**Office of Oceanic and Atmospheric Research (OAR) - [Developmental Testbed Center \(DTC\)](#)**

The Developmental Testbed Center (DTC) is a distributed facility where the Numerical Weather Prediction community can test and evaluate new models and techniques for use in research and operations. The DTC plays a prominent role in the development of the Unified Forecast System (UFS). DTC activities are primarily carried out at NOAA's Global Systems Laboratory (GSL) and the National Center for Atmospheric Research (NCAR) both located in Boulder, CO. GSL provides the NOAA component of funding for the DTC.



**Office of Oceanic and Atmospheric Research (OAR) - [Tunable Optical Profiler for Aerosol and Ozone Lidar](#)**

The Tunable Optical Profiler for Aerosol and oZone lidar (TOPAZ), operated since 2006 by the NOAA Earth Systems Research Laboratory's Chemical Science Laboratory measures tropospheric, or ground-level, ozone to provide high quality data to OAR's Weather and Air Quality Program. Tracking tropospheric ozone is important because prolonged exposure to it can impact human health. The TOPAZ system can be toured and discussed at its normal site in Boulder, CO, where it is mounted in an enclosed trailer.

**Office of Oceanic and Atmospheric Research (OAR) - [NOAA David Skaggs Research Center](#)**

The COVID pandemic substantially changed economic activity in Colorado cities and rural areas. A major effect of this change was a decrease in emissions from the transportation sector, which is a significant fraction of total emissions that cause air pollution. NOAA's Chemical Sciences Laboratory (CSL) mobilized a team of scientists and an array of instrumentation to quantify changes in atmospheric composition (and air pollution) with measurements conducted at the NOAA David Skaggs Research Center (DSRC) facility in Boulder, CO. The data show marked improvement in some air pollutant species and direct evidence that other emission sources (e.g., personal care products) play an ever-increasing air pollution role in urban regions.

**Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere®](#) - See [Page 2](#) for details.**

**Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere Explorer™](#) -See [Page 2](#) for details.**

**Office of Oceanic and Atmospheric Research (OAR) - [Uncrewed Systems Research Transition Office \(USRTO\) Project in Atmospheric Gases](#)**

Uncrewed Aircraft Systems (UAS) are used by NOAA to collect critical atmospheric observations to monitor and better understand the global environment, while bridging the gap between measurements taken on Earth's surface and those retrieved from satellites. GML is partnering with NASA to pioneer the use of a high altitude glider for collections of atmospheric gases, which will provide detailed information about the composition of the atmosphere and improve our understanding of climate change.

**Office of Oceanic and Atmospheric Research (OAR) - [Uncrewed Systems Research Transition Office \(USRTO\) Project in Air Quality Measurements](#)**

Uncrewed Aircraft Systems (UAS) are used by NOAA to fill critical observation gaps over and around wildfires at night when no manned aircraft observations are available. CSL is testing their use to capture atmospheric and air quality measurements while producing maps of firelines and intensities. This information will aid emergency response efforts and improve forecast model prediction of fire behavior with immediate societal impacts. The results will ultimately support better land management decisions and practices.

**Office of Oceanic and Atmospheric Research (OAR) - [Uncrewed Systems Research Transition Office \(USRTO\) Project in Climate Change](#)**

Uncrewed Aircraft Systems (UAS) are used by NOAA to understand the exchange of energy between Earth's surfaces and the overlying atmosphere. Energy flux throughout the atmospheric column plays a central role in the modulation of weather and climate. At PSL, vertical profiles of atmospheric properties are being collected with UAS to improve our understanding of climate and to predict future climate changes. Air quality forecasters use these observations to predict levels of pollutants that may impact visibility and/or human health.

**Office of Oceanic and Atmospheric Research (OAR) - [Ozone Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) conducts long-term monitoring of stratospheric ozone with balloons. Stratospheric ozone measurements provide data relevant to: surface pollution events, lower and upper atmosphere mixing dynamics, boundary layer stability, ozone trend studies (vertical distribution), and temperature and pressure profiles.

**Office of Oceanic and Atmospheric Research (OAR) - [Water Vapor Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) operates a stratospheric water vapor program using balloon-borne, chilled mirror hygrometers flown monthly at Boulder, CO and Hilo, HI and as part of campaigns at other locations to obtain water vapor profiles in the upper troposphere and lower stratosphere (to ~28 km). The 30-year record at Boulder is a unique record of measurements showing changes in stratospheric water vapor. These ongoing observations are essential for improving our understanding of stratospheric ozone and climate processes.

**Office of Oceanic and Atmospheric Research (OAR) – Surface Atmosphere [Ozone Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) conducts long-term monitoring of ozone at the surface, with aircraft, and with balloons, through cooperative relationships with local partners. The ESRL/GML tropospheric ozone aircraft measurement program is being done in conjunction with the Carbon Cycle and Greenhouse Gas (CCGG) group's existing aircraft sampling network. Aircraft based in-situ tropospheric ozone measurements provide data relevant to: pollution events, lower atmosphere mixing dynamics, boundary layer stability, ozone trend studies, and the validity of other samples collected in-flight. Near ground level, ozone is monitored at three locations using ultraviolet absorption photometers at eight sites that are generally representative of background conditions. These surface ozone sites, four of which have records exceeding 25 years in length, provide information on possible long-term changes in tropospheric ozone near the surface originating from the local oil and gas extraction sources, long-range pollution transport and biomass burning. These long term records support air quality research.

**Office of Oceanic and Atmospheric Research (OAR) - [Total Column Ozone Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) makes measurements of the column amounts of ozone between the earth's surface and the top of the atmosphere at a number of locations around the United States. The observations are obtained with ground-based spectrometers that measure the attenuation by ozone of ultraviolet light. These observations represent NOAA global stratospheric ozone network and are used to track recovery of stratospheric ozone layer in compliance with the USA Clean Air act of 1990. The integrated ozone amount is critical in determining the amount of ultraviolet radiation reaching the earth's surface. Excess ultraviolet radiation is responsible for human skin cancer and is also harmful to other biogenic organisms. Column ozone measurements monitor changes in the stratospheric ozone layer resulting from human-produced chlorine and bromine compounds that destroy ozone. With controls now in place on the manufacture and use of these ozone-destroying compounds, it will be important to monitor the ozone layer for the expected recovery and determine whether other factors such as long-term climate change are influencing this recovery.

**Office of Oceanic and Atmospheric Research (OAR) - [Stratospheric Aerosol Lidar Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) operates three stratospheric lidar systems to measure atmospheric aerosol profiles. The Boulder system went online in 1999. Stratospheric lidar systems measure aerosol light for monitoring stratospheric aerosols from volcanic origins. Volcanic aerosols in the stratosphere from future eruptions could act as catalysts for large-scale stratospheric ozone depletions until anthropogenic stratospheric halocarbon concentrations decrease to lower levels by mid-century. These ongoing observations are important for monitoring the recovery of the stratospheric ozone layer, which protects us from the sun's ultraviolet radiation.



**Office of the Chief Administrative Officer (OCAO) - [Real Property, Facilities, and Logistics Office](#)**

The Office of the Chief Administrative Officer (CAO) provides building management at the David Skaggs Research Center, including warehousing, storeroom operations, graphic arts, and health clinic operations.

**Office of the Chief Information Officer (OCIO) - [High Performance Computing and Communications](#)**

The Office of the Chief Information Officer manages research and development high performance computing for weather and climate modeling, research, and predictions, supporting improvements in areas such as the prediction of severe weather, seasonal prediction of temperature and precipitation, and forecasting the next Sandy-like storm.

**Office of Oceanic and Atmospheric Research (OAR) - [Information Resource Division](#)**

The DOC Boulder Laboratories Library provides information services and resources in support of the research of the Department of Commerce Boulder Laboratories agencies including NIST, NOAA, and NTIA. Services are also provided to DOC components in a nine state region. The Library provides circulation, interlibrary loan, reference, and literature searching services in support of the research. The Library also acquires, maintains and makes accessible information resources to support the scientific missions of the Boulder Laboratories.

**Office of the Chief Information Officer (OCIO) - [Service Delivery Division](#)**

The Service Delivery Division provides a suite of IT services to support NOAA's mission. Our work includes IT infrastructure design and maintenance, network and server management and administration, desktop configuration and maintenance, application and system design and implementation, and IT security.

**Office of the Chief Information Officer (OCIO) - [NOAA Cyber Security Center Back-up Site](#)**

The Boulder, Colorado location serves as a geographically diverse location for the NOAA Cyber Security Center (NCSC). In case the primary site of the NCSC at Fairmont, WV becomes isolated or unavailable, the Boulder location is a fully functional failover site with which the Fairmont site maintains peered information technology systems. By having a peer site, encompassing 100% of the functionality of the primary NCSC site, services can be switched seamlessly between Boulder and Fairmont, meaning routine maintenance and upgrades can be performed at one location while the other location remains continuously functional, better serving and protecting the NOAA IT mission. As a disaster recovery site, Boulder provides vital backup in case of an outage at Fairmont, and can perform the mission until the Fairmont site is reconstituted.

**Office of the Chief Information Officer (CIO) - [N-Wave NOAA Enterprise Network](#)**

Boulder, CO, hosts the N-Wave Program Office, which is responsible for managing and operating NOAA's cutting-edge enterprise network which supports both operations and research. The office also manages and operates all five of NOAA's Trusted Internet Connection Access Points which provide the security analytics required to ensure secure communication between NOAA networks and the greater internet. TICAPs are NOAA's first line of defense for protecting NOAA's mission from external cyber-attacks and the N-Wave network supports all NOAA's access to and from the Internet and public peering services. N-Wave enterprise network services are provided at multiple locations and, at many sites, is the main communications provider. N-Wave spans from Hawaii, to Alaska, and across the continental United States with international peering at the Washington D.C. TICAP.

Boulder, CO, is also one of the five NOAA Trusted Internet Connection Access Points (TICAPs). The information the TICAPs provide is invaluable for determining the nature and scope of cyber threats. NOAA is also able to offer this as a service to other government agencies, eliminating the requirement for them to build and manage their own TICAPs.

**Workforce Management Office (WFMO) - [Boulder Office](#)**

The Workforce Management Office employees in the Boulder Office are comprised of the Payroll and Timekeeping and Records teams servicing all of NOAA. The Payroll and Timekeeping team ensures accurate payroll and WebTA records, and processes payroll actions as appropriate. The team manages employee payroll functions for non-recruitment actions to include error corrections, as well as resolutions to pay errors. They provide support to customers for time and attendance issues, advisory and training services to customers, while also administering NOAA's Leave Share Program. The Records team maintains and manages eOPF records for the NOAA workforce. The team ensures accurate and up-to-date information is filed and indexed in each record, and ensures records are closed upon employee separation.

**NOAA Commissioned Officer Corps (NOAA Corps) - [Office of Oceanic and Atmospheric Research, National Ocean Service, and National Weather Service Support Officers](#)**

The NOAA Commissioned Officer Corps stations officers across multiple line offices in Boulder, CO to support those offices' missions administratively and operationally. These officers perform a variety of duties, including acting as liaison between the Office of Marine and Aviation Operations and the Office of Oceanic and Atmospheric Research; serving as NOAA liaison to US Northern Command and NORAD; training to serve as station chief at the South Pole; serving in a staff support role for South Pole operations; serving as backup Space Weather Duty Forecaster; developing opportunities for outreach and education to promote the NOAA Corps and Space Weather enterprise; serving as the NCEI liaison for the ocean and coastal data archive for NOAA's Integrated Ocean and Coastal Mapping Program; and serving as Branch Chief for Coastal Marine Geophysics. Officers fill these critical roles necessary for the success of NOAA operations State- and Nation-wide.

**[Boulder, Longmont, and Niwot Ridge](#)**

**Office of Oceanic and Atmospheric Research (OAR) - [Ultraviolet Radiation Monitoring Network](#)**

The Earth System Research Laboratory Global Monitoring Division (ESRL/GML) operates an ultraviolet radiation (UV) monitoring network (NEUBrew) in Colorado, with sites in Boulder, Table Mountain, and Niwot Ridge. These measurements are done as part of ESRL/GML's research on the Earth's surface radiation budget. Research efforts are devoted to the extent and cause of observed variations in long-term radiation and meteorological measurements, using satellite observations and climate model calculations. In addition, observations of spectral solar radiation are made for the purpose of remote sensing of certain atmospheric constituents and spectral solar UV is measured for the investigation of the interaction of ozone and solar radiation. ESRL/GML also provides essential instrument calibration services for national and worldwide partner UV monitoring networks.

**[Denver](#)**

**National Weather Service (NWS) - [Center Weather Service Unit](#)**

Housed in the Federal Aviation Administration's Denver Air Route Traffic Control Center (ARTCC), the NWS Center Weather Service Unit (CWSU) provides forecasts and other weather information to ARTCC personnel for use in directing the safe, smooth flow of aviation traffic. The area covered includes most of Colorado and parts of Wyoming, Utah, Arizona, New Mexico, Kansas, Nebraska and South Dakota.

**[Niwot Ridge](#)**

**Office of Oceanic and Atmospheric Research (OAR) - [Cooperative Global Air Sampling Network](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) operates a Cooperative Global Air Sampling Network to measure the distribution and trends of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>), the two gases most responsible for human-caused climate change, as well as other greenhouse gases and volatile organic compounds. Samples are collected weekly at fixed locations and on several commercial ships. The air samples are delivered to ESRL/GML, located in Boulder, CO. The observed geographical patterns and small but persistent spatial gradients are

used to better understand the processes, both natural and human induced, that underlie the trends. Air samples have been collected at 3475-meter elevation on Niwot Ridge, Colorado since 1968. The samples are collected by researchers at the Mountain Research Station operated by the University of Colorado's Institute for Arctic and Alpine Research. Samples collected at Niwot Ridge represent free tropospheric air that has passed over the western U.S. and possibly Canada. These measurements help determine the magnitude of carbon sources and sinks in North America.

**Office of Oceanic and Atmospheric Research (OAR) - [Halocarbon Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) operates a sampling network to measure the distribution and trends of the gases most responsible for human-caused depletion of the stratospheric ozone layer. Weekly samples are collected in high-pressure flasks at fixed locations. The air sample flasks are delivered to ESRL/GML, located in Boulder, CO for analysis. Some locations conduct continuous surface measurements on site. Halocarbon measurements help determine the effectiveness of efforts to protect and restore the ozone layer - so it can protect us from the sun's ultraviolet radiation.

**Office of Oceanic and Atmospheric Research (OAR) - [Ozone Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) conducts long-term monitoring of ozone at the surface. Near ground level ozone is currently monitored using ultraviolet absorption photometers at eight sites that are generally representative of background conditions. These sites, four of which have records exceeding 25 years in length, provide information on possible long-term changes in tropospheric ozone near the surface and support air quality research.

**[Fort Collins](#)**

**Office of Oceanic and Atmospheric Research (OAR) - [Cooperative Institute for Research in the Atmosphere](#)**

The Cooperative Institute for Research in the Atmosphere (CIRA) was established at Colorado State University. CIRA serves as a key mechanism to promote collaborative research between university scientists and those in NOAA. CIRA's research vision is to improve interdisciplinary research in the atmospheric sciences by entraining skills beyond the meteorological disciplines, exploiting cutting-edge advances in engineering and computer science, facilitating transitional activity between pure and applied research, and assisting the nation through the application of its research. NOAA partners include the Office of Oceanic and Atmospheric Research; National Environmental Satellite, Data, and Information Service, and National Weather Service. CIRA conducts research across five themes: (1) satellite algorithm development, training and education; (2) regional to global scale modeling systems; (3) data assimilation; (4) climate-weather processes; and (5) data distribution.

**National Environmental Satellite, Data, and Information Service (NESDIS) - [Center for Satellite Applications and Research](#) - [Regional and Mesoscale Meteorology Branch](#)**

The Regional and Mesoscale Meteorology Branch (RAMMB), within the Center for Satellite Applications and Research (STAR) of the National Environmental Satellite, Data, and Information Service (NESDIS), is physically collocated with the Cooperative Institute for Research in the Atmosphere (CIRA) on the Colorado State University foothills campus in Fort Collins CO. The RAMMB conducts research and development activities in collaboration with university scientists within CIRA on the broad theme of regional and small scale meteorological studies related to weather and climate with emphasis on applications of meteorological satellite data to those studies. The relationship between the university and RAMMB enables NOAA to adopt demonstrated research techniques for deriving atmospheric information from remote sensing data for broader distribution to the science community.

### CO-3

#### Cortez

##### Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)

The US Climate Reference Network (USCRN) is an operationally viable research network of more than 138 climate stations that are deployed nationwide. Data from the USCRN are used in various climate monitoring activities and for placing current climate anomalies into an historical perspective. The USCRN provides the United States with a reference network that contributes to an International network under the auspices of the Global Climate Observing System (GCOS). ARL/ATDD manage the USCRN in partnership with NOAA's NESDIS/NCEI.

#### Dinosaur

##### Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)

The US Climate Reference Network (USCRN) is an operationally viable research network of more than 138 climate stations that are deployed nationwide. Data from the USCRN are used in various climate monitoring activities and for placing current climate anomalies into an historical perspective. The USCRN provides the United States with a reference network that contributes to an International network under the auspices of the Global Climate Observing System (GCOS). ARL/ATDD manage the USCRN in partnership with NOAA's NESDIS/NCEI.

#### Grand Junction

National Weather Service (NWS) - [Weather Forecast Office](#) - See [Page 2](#) for details.

#### Montrose

##### Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)

The U.S. Climate Reference Network (USCRN) is an operationally viable research network of 135 climate stations that are deployed nationwide. Data from the USCRN are used in various climate monitoring activities and for placing current climate anomalies into an historical perspective. The USCRN provides the United States with a reference network that contributes to an International network under the auspices of the Global Climate Observing System (GCOS).

#### Steamboat Springs

##### Office of Oceanic and Atmospheric Research – [Surface Aerosol Monitoring](#)

NOAA's Earth System Research Laboratory Global Monitoring Laboratory(ESRL/GML) operates surface-based aerosol monitoring sites in six states and one territory (Puerto Rico). ESRL/GML's aerosol monitoring capabilities include continental sites in response to the finding that human activities primarily influence aerosols on regional/continental scales rather than on global scales. Aerosols create a significant perturbation of the Earth's radiative balance on regional scales. The measurements made include aerosol optical properties (how the particles absorb and scatter solar radiation), aerosol number concentration and chemical composition of the aerosol particles. The site is a partnership with Desert Research Institute.

#### Pueblo

National Weather Service (NWS) - [Weather Forecast Office](#)- See [Page 2](#) for details.

### CO-4

#### Briggsdale

##### Office of Oceanic and Atmospheric Research (OAR) – [Carbon Cycle Gases and Halocarbons Measurements](#)

NOAA's Earth System Research Laboratory Global Monitoring Laboratory(ESRL) operates a small aircraft-based North American network of sampling sites to measure vertical profiles of important greenhouse gas concentrations. Air is sampled above the surface up to approximately 25,000 feet above sea level using a relatively small, light, and economical automated system developed by ESRL/GML researchers. These air samples are delivered to ESRL/GML in Boulder,

Colorado for measurements of CO<sub>2</sub>, CH<sub>4</sub>, and other greenhouse gasses. This data will improve understanding and models of the global carbon cycle. Sampling is conducted bi-weekly. Some air samples from the small aircraft program are also analyzed for halocarbon gases that can destroy the stratospheric ozone layer. Halocarbon measurements help determine the effectiveness of efforts to protect and restore the ozone layer so it can protect us from the sun's ultraviolet radiation.

### **La Junta**

#### **Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)**

The US Climate Reference Network (USCRN) is an operationally viable research network of more than 138 climate stations that are deployed nationwide. Data from the USCRN are used in various climate monitoring activities and for placing current climate anomalies into an historical perspective. The USCRN provides the United States with a reference network that contributes to an International network under the auspices of the Global Climate Observing System (GCOS). ARL/ATDD manage the USCRN in partnership with NOAA's NESDIS/NCEI.

### **Longmont, Table Mountain**

#### **National Ocean Service (NOS) - [National Geodetic Survey's Gravity Program](#)**

The Table Mountain Geophysical Observatory (TMGO) near Longmont, CO houses equipment for the National Geodetic Survey's Gravity and Global Navigation Satellite System (GNSS) programs. Local and worldwide gravity data are collected in conjunction with latitude, longitude, height, and velocity to increase the reliability, accessibility, and accuracy of the National Spatial Reference System.

#### **Office of Oceanic and Atmospheric Research (OAR) - [Surface Aerosol Monitoring](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) operates surface-based aerosol monitoring sites in six states and one territory (Puerto Rico). ESRL/GML's aerosol monitoring capabilities include continental sites in response to the finding that human activities primarily influence aerosols on regional/continental scales rather than on global scales. Aerosols create a significant perturbation of the Earth's radiative balance on regional scales. The measurements made include aerosol optical properties (how the particles absorb and scatter solar radiation), aerosol number concentration and chemical composition of the aerosol particles.

#### **Office of Oceanic and Atmospheric Research (OAR) - [Surface Radiation Measurement Network](#)**

NOAA's Earth System Research Laboratory Global Monitoring Laboratory (ESRL/GML) operates seven stations as part of its surface radiation budget network (SURFRAD). The station measurements support regional and global weather and climate research with accurate, continuous, long-term measurements of the surface radiation budget over the United States. Solar radiation is the driving energy for geophysical and biological processes that control weather and affect planetary life; understanding the global surface energy budget is therefore key to understanding climate and the environmental consequences to agriculture and other statewide concerns. Because it is impractical to cover the whole earth with monitoring stations, the answer to global coverage lies in reliable satellite-based observations. Accurate and precise ground-based measurements across a range of climate regions are essential to refine and verify the satellite observations. One of these stations is located near Boulder. These ground-based measurements also support special research projects on radiation and climate processes in the Colorado region and serve as important verification for weather forecasts.

### **Nunn**

#### **Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)**

The US Climate Reference Network (USCRN) is an operationally viable research network of more than 138 climate stations that are deployed nationwide. Data from the USCRN are used in various climate monitoring activities and for

placing current climate anomalies into an historical perspective. The USCRN provides the United States with a reference network that contributes to an International network under the auspices of the Global Climate Observing System (GCOS). ARL/ATDD manage the USCRN in partnership with NOAA's NESDIS/NCEI.

#### **Parker**

**Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere®](#) - See [Page 2](#) for details.**

#### **NOAA Office of Education - [Environmental Literacy Program](#)**

NOAA's Environmental Literacy Program (ELP), administered by the Office of Education, provides grants and in-kind support to advance NOAA's mission through formal (K-12) and informal education. In Colorado, ELP supports the University of Colorado South Denver's Wildlife Experience (Douglas), which has a permanent exhibit featuring NOAA's Science On a Sphere (SOS) and is a member of NOAA's SOS Users Collaborative Network (SOS Network). The SOS Network connects over 150 science education institutions worldwide to the latest NOAA data as part of a focused effort to increase environmental literacy at all ages.

#### **Platteville**

##### **Office of Oceanic and Atmospheric Research (OAR) - [Wind Profiler Observing System](#)**

The NOAA Physical Sciences Laboratory installed a wind profiler observing system to test and evaluate new signal processing and data algorithms to improve the quality and reliability of real-time wind and temperature profile data collected by these instruments. A side benefit of this project is to provide these data to the Denver/Boulder Weather Forecast Office to support weather and terminal aerodrome forecasts.

##### **Office of Oceanic and Atmospheric Research (OAR) - [Platteville Atmospheric Observatory- Air Pollution Control Station](#)**

NOAA has executed a five-year agreement with Colorado's Air Pollution Control Division (APCD) to host an air quality monitoring station at the Platteville Atmospheric Observatory (PAO) facility managed by NOAA's Chemical Sciences Laboratory (CSL). The previous APCD station was moved from the town of Platteville to the PAO, which is located in the heart of the oil and gas development region of Weld County, due to the need to monitor air quality associated with those activities.

#### **CO-5**

##### **[Colorado Springs](#)**

**Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere®](#) - See [Page 2](#) for details.**

#### **NOAA Office of Education - [Environmental Literacy Program](#)**

NOAA's Environmental Literacy Program (ELP), administered by the Office of Education, provides grants and in-kind support to advance NOAA's mission through formal (K-12) and informal education. In Colorado, ELP supports the Space Foundation (El Paso), which has a permanent exhibit featuring NOAA's Science On a Sphere (SOS) and is a member of NOAA's SOS Users Collaborative Network (SOS Network). The SOS Network connects over 150 science education institutions worldwide to the latest NOAA data as part of a focused effort to increase environmental literacy at all ages.

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## **Statewide**

### **National Marine Fisheries Service (NMFS) and National Ocean Service (NOS) - [Damage Assessment, Remediation, and Restoration Program](#)**

NOAA's Damage Assessment, Remediation, and Restoration Program (DARRP) assesses and restores habitat, fisheries, protected species and recreational uses that have been harmed by oil spills, chemical releases, and ship groundings. Working with federal, state, and tribal entities, and responsible parties, we have recovered funding from responsible parties for restoration of critical habitats, fisheries, protected species and recreational uses nationwide. These projects promote recovery of the ecosystem and provide economic benefits from tourism, recreation, green jobs, coastal resiliency, property values and quality of life.

### **National Ocean Service (NOS) – [Regional Geodetic Advisor](#)**

The Regional Geodetic Advisor is a National Ocean Service (NOS) employee that resides in a region and serves as a liaison between the National Geodetic Survey (NGS) and its public, academic and private sector constituents within their assigned region. NGS has a Regional Geodetic Advisor stationed in Boulder, Colorado serving the Rocky Mountain region – Colorado, Montana, and Wyoming. The Geodetic Advisor provides training, guidance and assistance to constituents managing geospatial activities that are tied to the National Spatial Reference System (NSRS), the framework and coordinate system for all positioning activities in the Nation. The Geodetic Advisor serves as a subject matter expert in geodesy and regional geodetic issues, collaborating internally across NOS and NOAA to ensure that all regional geospatial activities are properly referenced to the NSRS.

### **National Weather Service - [NEXRAD \(WSR-88D\) Systems](#)**

NEXRAD is used to warn the people of the United States about dangerous weather and its location. This radar technology allows meteorologists to warn the public to take shelter with more notice than ever before. The NEXRAD network provides significant improvements in severe weather and flash flood warnings, air traffic safety, flow control for air traffic, resource protection at military bases, and management of water, agriculture, forest, and snow removal. NEXRAD radar has a range of up to 250 nautical miles, and can provide information about wind speed and direction, as well as the location, size, and shape of precipitation. There are 159 operational NEXRAD radar systems deployed throughout the United States and overseas, of which three are in Colorado.

### **National Weather Service (NWS) - [Automated Surface Observing Systems Stations](#)**

The Automated Surface Observing Systems (ASOS) program is a joint effort of the National Weather Service (NWS), the Federal Aviation Administration (FAA), and the Department of Defense (DOD). ASOS serves as the Nation's primary surface weather observing network. ASOS is designed to support weather forecast activities and aviation operations and, at the same time, support the needs of the meteorological, hydrological, and climatological research communities. ASOS works non-stop, updating observations every minute, 24 hours a day, every day of the year observing basic weather elements, such as cloud cover, precipitation, wind, sea level pressure, and conditions, such as rain, snow, freezing rain, thunderstorm, and fog. There are 21 ASOS stations in Colorado.

### **National Weather Service (NWS) - [Cooperative Observer Program Sites](#)**

The National Weather Service (NWS) Cooperative Observer Program (COOP) is truly the Nation's weather and climate observing network of, by and for the people. More than 10,000 volunteers take observations on farms, in urban and suburban areas, National Parks, seashores, and mountaintops. The COOP was formally created in 1890 under the NWS Organic Act to provide observational meteorological data, usually consisting of daily maximum and minimum temperatures, snowfall, and 24-hour precipitation totals, required to define the climate of the United States and to help measure long-term climate changes. The data are also used by other federal (including the Department of Homeland Security), state and local entities, as well as private companies (such as the energy and insurance industries). In some

cases, the data are used to make billions of dollars' worth of decisions. For example, the energy sector uses COOP data to calculate the Heating and Cooling Degree Days which are used to determine individuals' energy bills monthly. There are 340 COOP sites in Colorado.

**National Weather Service (NWS) - [NOAA Weather Radio All Hazards Transmitters](#)**

NOAA Weather Radio All Hazards (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service (NWS) forecast office. NWR broadcasts official NWS warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week. Working with the Federal Communication Commission's (FCC) Emergency Alert System, NWR is an "All Hazards" radio network, making it the single source for comprehensive weather and emergency information. In conjunction with federal, state, and local emergency managers and other public officials, NWR also broadcasts warning and post-event information for all types of hazards – including natural (such as earthquakes or avalanches), environmental (such as chemical releases or oil spills), and public safety (such as AMBER alerts or 911 Telephone outages). Known as the "Voice of NOAA's National Weather Service," NWR is provided as a public service by the NWS. NWR includes 1,100 transmitters covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories. There are 29 NWR transmitters in Colorado.

**National Weather Service (NWS) - [Incident Meteorologists](#)**

The NWS, as mandated by Congress, provides fire weather forecast products and services to the fire and land management community for the protection of life and property, promotion of firefighter safety, and stewardship of America's public wildlands. Since 1928, this effort has included providing critical on-scene support to wildfire managers via specially-trained NWS forecasters called Incident Meteorologists (IMETs). When a fire reaches a large enough size, IMETs are rapidly deployed to the incident and set-up a mobile weather center to provide constant weather updates and forecast briefings to the fire incident commanders. IMETs are very important members of the firefighting team, as changes in the fires are largely due to changes in the weather.

**NOAA Office of Education — [Environmental Literacy Program](#)**

NOAA's Environmental Literacy Program (ELP), administered by the Office of Education, provides grants and in-kind support to advance NOAA's mission through formal (K-12) and informal education. In Colorado, ELP supports the Trout Bowl in Colorado, one of 25 regional competitions of the National Ocean Sciences Bowl (NOSB). The NOSB is an academic competition that engages high school students in learning about ocean sciences and related STEM careers while helping them become knowledgeable citizens and environmental stewards. ELP supports the American Meteorological Society's DataStreme courses for K-12 educators through a grant and in-kind support. These courses use weather, climate, and the ocean as contexts for teaching science and improving understanding about the Earth system.

**National Ocean Service (NOS) - Students for [Zero Waste Week](#)**

Students are inviting their local communities to "Go Green and Think Blue" by joining them in the annual *Students for Zero Waste Week campaign*. During this campaign led by the Office of National Marine Sanctuaries, students focus on reducing land-based waste in order to protect the health of local marine environments. These young leaders are raising awareness of how single-use plastic and other types of litter affect the health of local watersheds, national marine sanctuaries, and the ocean. In addition, some schools are looking at ways to reduce their energy use on campus with hopes of raising awareness of how the burning of fossil fuels also impacts the health of the ocean.

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